PROJECT DESCRIPTION

The purpose of this study was to obtain baseline information on patterns of abundance of grassland songbirds on WPAs containing native prairie relative to surrounding landscape structure (spatial arrangement and composition) at Kulm Wetland Management District (WMD), and 2) develop science-driven management strategies that will benefit grassland songbird species included in the Kulm WMD Habitat Management Plan (HMP). Conservation of these species is important as their presence is an indicator of ecosystem function and their distribution and abundance coincides with species having similar requirements.

OBJECTIVES AND ALTERNATIVES

The objectives of this study were to: 1) investigate whether local- (i.e., habitat composition and structure) and/or landscape-scale (i.e., landscape composition and spatial arrangement of suitable habitat) processes regulate patterns of grassland passerine habitat selection and abundance on WPAs in Kulm WMD and 2) validate the WPA prioritization framework that will guide management of habitat for grassland songbirds for the next 15 years.

METHODS AND PROTOCOLS

We estimated the occurrence of individual songbird species along randomly placed line-transect surveys using distance sampling methodology (Buckland 2006) at 21 WPAs containing native prairie tracts (range = 51.2 – 214 acres) in Kulm WMD. We sampled each WPA containing a survey area twice during the breeding season (between May 25 and July 5) to capture potential differences in passerine migration and behavior. The number of transects on each native prairie tract was scaled to the size of the area being surveyed. Only songbird pairs (singing male or male/female pair) were recorded by sight and sound. We documented bird movements to avoid double counting and walked transects slowly, stopping frequently to identify birds. We will maintain independence of bird observations by spacing transects diagonally (45°) at ≥250-m apart following the methods used by Madden et al. (2000) and Ralph et al. (1993).

To remove confounding effects of passive sampling that may occur between area sampled and songbird density (see Gaston et al. 1999, Johnson 2001), we will produce a standardized area estimate of bird density for each survey area by regressing the log bird density against the log of the survey area following Gaston et al. (1999). The result will be a log-transformed estimate of density adjusted for each survey area that is standardized across survey tracts. This will remove any bias potentially associated with sampling large (>150 ac) native tracts in areas containing a high percentage (>75%) of grassland cover.

We measured vegetation composition at 1-m intervals along the entire length of the transect using the belt-transect method (Grant et al. 2004). Because many of the transects exceed 1000-m, it was not feasible to conduct assessment of habitat composition at <1-m intervals. We measured visual obstruction using a modified Robel pole (Robel 1970, Benkobi et al. 2000) and litter depth at 20-m intervals along the transect.

We used GIS technology to evaluate selection at multiple scales (i.e., 100-, 200-, 400-, 800-, 1600-, and 3200-m) using 2006 National Land Cover Dataset imagery. Land-use categories will be summarized at each scale and incorporated in models to identify scales important to individual songbird species.

DATA ANALYSIS / MODELS

Because of the complexity of the final analyses described below, we will complete the analyses after the third year of research is completed in FY13. We will evaluate local and landscape-scale factors that influence bird abundance using logistic regression models (Hosmer and Lemeshow 2000) and Akaike's information criteria (AIC; Burnham and Anderson 2002) as the basis for model selection. We will assign use (points where birds are observed) and random (points at each 20-m interval along the transect that did not have a bird observation, but did have a sample for vegetation structure and composition) to achieve the binary design required for logistic regression. We will test the effects of management practices by including two frequency variables (number of years since last treatment, number of treatment during previous 5 years) and by including several vegetation structure variables (litter, maximum vegetation height, visual obstruction) and vegetation composition variables along with interaction between management variables in the model set. We will account for shared variation among variables using linear regression to generate a semi-partial correlation value using SPSS software. We will control for spatial autocorrelation using autocovariate models which can be applied to binomial data (Smith 1994). We will test for collinearity between variables using Pearson's correlation coefficient ($r < \left| 0.60 \right|$) prior to inclusion of each variable in the model set.

DATA MANAGEMENT

Software used to store information for the project will include: 1) SPSS Statistics 19, 2) Microsoft Word/Excel, and 3) GIS spatial data in ArcMap 10 in compliance with existing policy (274 FW 1).

PARTNERS

Over 11 people have been involved in the project, representing the USFWS, USGS, and South Dakota State University.

SOURCES OF SUPPORT

In addition to FY12 I&M funds received, approximately $7,500 in in-kind support from South Dakota State University was contributed towards the project.

CURRENT STATUS

We collected 4,014 observations (1,816 in 2011, 2,198 in 2012) from 36 grassland songbird species on 21 waterfowl production areas (WPAs) in the Kulm Wetland Management District. Similar to 2011, the five most common species in 2012 were clay-colored sparrow (*Spizella pallida*), red-winged blackbird (*Agelaius phoeniceus*), savannah sparrow (*Passerculus sandwichensis*), bobolink (*Dolichonyx oryzivorus*), and brown-headed cowbird, respectively.

We are working closely with the Prairie Pothole Joint Venture to incorporate verification of their recently completed spatial models into our sampling framework for FY2013. Verification of these models is critical to ensure that models accurately predict patterns of abundance and can be used for detailed conservation planning in the Dakotas.

CHALLENGES

The second year of project was completed as proposed. A final year of data collection is necessary in 2013 to evaluate year effects that may occur with environmental variation. A 2-year study is not adequate to address patterns of environmental variation that are known to influence grassland songbird abundance.

MORE INFORMATION

A final comprehensive analysis will be completed during the winter of 2013-2014. A manuscript will then be developed and submitted for publication. This publication will serve as the final I&M report for the project.

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